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# How teacher students relate their experiences of AI-generated feedback to future teaching practice

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## ABSTRACT

This study explores how teacher students experience AI-generated feedback provided through a digital response system during campus-based seminars and how they relate these experiences to their future teaching practice. Unlike research focusing on individual uses of generative AI, this study examines AI feedback embedded in a collaborative think–pair–share activity where teacher students participate as both learners and prospective teachers. Data were collected through observations, written reflections, and interviews, and analyzed thematically. Teacher students appreciated the AI-generated feedback for its immediacy, structure, and capacity to prompt reflection. At the same time, they questioned its reliability, contextual sensitivity, and ethical appropriateness in classroom settings. They described a trust hierarchy in which teacher feedback was relied upon most, followed by AI-generated feedback, while peer feedback ranked lowest. During the seminars, AI-generated feedback became a shared reference point that students compared, questioned, and discussed, positioning it as part of the interaction rather than a time-saving tool. Teacher students connected these experiences to concrete considerations about how similar feedback arrangements could be used, adapted, or avoided in their own classrooms, particularly in relation to comparing feedback sources, pedagogical responsibility, feedback practices, and digital competence.

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## Introduction

Recent advances in generative AI have opened new ways to automate feedback, raising questions about how such tools impact feedback practices in teacher education (Hidayat & Sujarwati, 2024; Trust et al., 2023; Tubino & Adachi, 2022). As future educators, teacher students represent a unique student group, engaging with generative AI as learners and future teachers who may shape how these technologies are adopted in teaching and learning. Feedback plays a central role in teacher education, as it supports teacher students' learning while also helping them develop the ability to provide timely, constructive feedback to others, a key teaching skill (Black & Wiliam, 2009; Carless, 2022;

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Hattie & Timperley, 2007). However, providing personalized feedback is resource-intensive and difficult to scale (Gibbs & Simpson, 2005; Nicol & Macfarlane-Dick, 2006).

To develop teacher students' feedback literacy, peer feedback has long been used in teacher education to enhance students' learning while building their evaluative judgment and ability to give feedback – core aspects of professional practice (Boud & Molloy, 2013; Carless & Boud, 2018). However, peer feedback can be challenging: students may feel unsure about assessing peers' work or uncomfortable giving critique. Structured training has been shown to improve the quality of feedback and student performance (Sluijsmans et al., 2002), underscoring the need for well-designed activities. One way to support formative teaching strategies, such as peer interaction and feedback (Black & Wiliam, 2009), is through digital response systems, which allow real-time, often anonymous participation and are widely used to encourage participation, discussion, and feedback in large groups (Blasco-Arcas et al., 2013;; Hunsu et al., 2016). A well-known example is peer instruction, where students first respond individually and then discuss their reasoning with peers (Crouch & Mazur, 2001), positioning students as instructional resources for one another.

With recent advances in generative AI, AI-enhanced response systems can now provide automated feedback, offering new opportunities for scalable, individualized feedback that has traditionally been difficult to achieve in real time with larger groups. While many teacher students already use generative AI tools individually to support their academic writing, for example, to improve grammar, coherence, or structure (Hidayat & Sujarwati, 2024; Picciano, 2024; Trust et al., 2023), their experiences of receiving AI-generated feedback in group activities remain largely underexplored. In this paper, AI-generated feedback refers to feedback messages produced in real time by a generative AI component integrated into a digital response system, conditioned on each student's free-text submission within the activity. We use 'generative AI' as an umbrella term for large-model-based content generation; in our case, text. Our focus in this study is on how teacher students experience such feedback in seminars and how they relate those experiences to their future teaching.

International frameworks such as AILIT and DigCompEdu emphasize interaction, formative assessment, and critical reflection when using AI and digital tools in education (OECD, 2025; Punie & Redecker, 2017). For teacher students, AI literacy involves not only technical skills but also the capacity to judge when and why to use AI-generated feedback, how to combine it with peer and teacher feedback, and how to surface both benefits and risks in authentic classroom tasks (Celik et al., 2022; MacDowell et al., 2024; Manila et al., 2025; Selwyn, 2024). However, studies indicate a persistent gap between these policy goals and the implementation of digital competence and AI literacy in teacher education (Gudmundsdottir & Hatlevik, 2018; Sperling et al., 2024). This study addresses that gap in a concrete seminar setting.

The study took place in campus-based seminars within Swedish STEM teacher education. In a teacher-led think-pair-share activity, students first submitted short free-text responses to a pedagogical question through a digital response system and immediately received AI-generated feedback on their submissions. They then discussed their submissions and the AI-generated feedback in pairs and with the entire group. We explore how teacher students described and reasoned about these in-

seminar experiences, and how they connected them to potential uses of AI-supported feedback in their future teaching.

### ***Aim and research question***

As future educators, teacher students need to understand AI-supported feedback tools and develop the pedagogical judgment required to decide when and how to use them. This study explores how teacher students experience and reason about AI-generated feedback provided through a digital response system during campus-based seminars, and how they relate those experiences to their future teaching practice. It is guided by the following research question:

- How do teacher students relate their in-seminar experiences of AI-generated feedback from a digital response system to their future teaching practice?

Although situated in a specific seminar context, our analysis focuses on how students experienced the feedback within the activity, and how they envisioned using similar tools in their future teaching.

### **Related research**

#### ***Generative AI feedback in teacher education: from individual use to seminar activities***

Research on generative AI in teacher education has mainly focused on how AI tools support writing, learning, and feedback tasks. Studies show that teacher students frequently use generative AI to refine language, coherence, and structure in written assignments (Hidayat & Sujarwati, 2024; Picciano, 2024; Trust et al., 2023). Baidoo-Anu and Owusu Ansah (2023) describe generative AI as a readily accessible support resource in such contexts. Beyond writing support, studies examine how generative AI systems produce feedback on open-ended input and how this depends on model design and prompt formulation (Jacobsen & Weber, 2025). Related work discusses the kinds of capabilities and understandings students and teachers may need in order to work with AI-generated feedback in educational settings (Markauskaite et al., 2022). Recent work also examines how students engage with AI feedback and links these engagement patterns to feedback literacy in generative AI-supported writing tasks (Zhan & Yan, 2025). Studies on AI in formative assessment contexts highlight how AI is positioned alongside, rather than in place of, existing feedback practices (Zhai & Nehm, 2023). Recent qualitative studies likewise show that AI-generated feedback can stimulate motivation and peer discussion in teacher education, while also raising concerns about limited contextual sensitivity (Yildiz Durak & Onan, 2025).

Most previous research has examined generative AI as a tool for individual student support in teacher education. Less is known about how AI-generated feedback functions when it is embedded in collaborative seminar activities where teacher, peer, and AI feedback are all available at the same time. This matters because seminar activities usually require students to interpret and act on feedback together rather than individually.

In such settings, feedback is not simply delivered and received but constructed through interaction. Feedback processes are often situated within collaborative interaction and shared interpretation (Gerard et al., 2019). At the same time, recent studies show that, in some contexts, large language models can produce feedback that closely aligns with formal assessment criteria (Dai et al., 2024) by explicitly addressing each rubric component. Research further emphasizes that effective feedback requires active student roles and the development of feedback literacy (Carless, 2022), making this a key pedagogical concern in teacher education.

### ***Feedback literacy and evaluative judgment when comparing feedback sources***

Research on feedback increasingly emphasizes that feedback is not an inherently authoritative input but becomes meaningful through learners' interpretation, evaluation, and subsequent action. In teacher education, this is linked to the development of evaluative judgment, understood as the ability to assess the quality of work, including one's own (Boud & Molloy, 2013; Sluijsmans et al., 2002). Related work on feedback literacy similarly highlights learners' active engagement with feedback and their capacity to use feedback information to improve learning (Carless, 2022), as well as the role of iterative revision and purposeful use of feedback resources to support participation (Tubino & Adachi, 2022).

When teacher, peer, and AI-generated feedback coexist, students must interpret, evaluate, and decide how to use different forms of input. Evaluative judgment and feedback literacy are therefore central for understanding how learners make sense of feedback and translate it into subsequent learning actions.

### ***Trust and reliance across teacher, peer, and AI feedback***

A related line of research focuses on how teacher students trust, view, and use feedback from different sources. In feedback research, trust is commonly defined as the learner's willingness to rely on a feedback source when deciding how to move forward in their learning (Carless, 2012; Carless & Boud, 2018). Trust is shaped by how credible, knowledgeable, and accountable a feedback source is perceived to be.

Prior studies show systematic differences in how feedback from teachers, peers, and automated systems is experienced. Peer feedback is often found to be less specific and less critical than teacher feedback, particularly among less experienced students (Hamer et al., 2015). Teacher feedback is frequently discussed in terms of contextual and pedagogical attunement (Carvalho et al., 2022; Zhang & Zhang, 2024). AI-generated feedback, in contrast, is typically described as structured and fluent, that is, linguistically polished and coherent (Nygren et al., 2025). Preferences or hesitations toward automated feedback have also been linked to algorithm aversion (Nazaretsky et al., 2024). Comparative studies further report differences in how teacher, peer, and AI feedback are perceived and utilized in learning, with teacher feedback producing the strongest learning gains, peer feedback supporting improvements in writing quality, and AI feedback often perceived as fair and neutral but yielding smaller improvements overall (Weidlich et al., 2025).

When teacher, peer, and AI-generated feedback are available side by side, students may need to compare and prioritize between different sources of input (Kim et al., 2024; Pahi et al., 2024). In such settings, differences in perceived credibility and

accountability shape how willing learners are to rely on each source. In seminar settings such as the one studied here, teacher students engage with feedback sources as learners deciding how to move forward in their own work and as future teachers reflecting on how such sources might be used in classroom practice. Trust therefore becomes central for understanding how learners relate to and take up feedback from teachers, peers, and AI tools.

### ***AI literacy in relation to AI-generated feedback***

Scholars have discussed how AI is positioned within learning activities. In some work, AI is described as participant-like in the sense that its generated outputs can be taken up as contributions in ongoing interaction, without implying agency or intention (Birhane et al., 2022; Gibson & Beattie, 2024). Studies in teacher education also highlight different approaches to integrating generative AI, including co-creation activities that encourage reflection on teaching and authorship (MacDowell et al., 2024). Literature reviews further indicate variation in how teacher education programs address AI-related competencies (Salas-Pilco et al., 2022), with limited training and practical experience of using AI identified as recurring challenges (Aljemely, 2024).

In this study, we focus on the AI literacy teacher students need to be able to critically engage with AI-generated feedback as a pedagogical resource. This includes recognizing limitations and possible inaccuracies, judging whether AI-generated feedback fits pedagogical goals, deciding how it should be combined with teacher and peer feedback, and considering ethical issues such as responsibility, transparency, and appropriate use with younger students, drawing on existing conceptualizations and critical perspectives on AI in education, and emerging AI literacy frameworks for education (Celik et al., 2022; OECD, 2025; Selwyn, 2024).

Taken together, prior research explains how AI-generated feedback is used and discussed in teacher education. However, we still know little about how teacher students experience AI-generated feedback when it is embedded in collaborative seminar activities where teacher, peer, and AI feedback are available at the same time – and how these experiences connect to anticipated classroom practice. Addressing this gap, the present study explores how teacher students relate their in-seminar experiences of AI-generated feedback from a response system to future teaching practice. We do so through the analytic lenses of feedback literacy, trust as a basis for reliance across feedback sources, and AI literacy in feedback contexts.

## **Methods**

### ***Data collection***

This qualitative study combined non-participant observations, short written reflections collected during activities in campus seminars, and follow-up semi-structured interviews with teacher students.

## Context

The data were collected during three campus-based seminars in spring and autumn 2024 at a Swedish university. Two teacher educators led the sessions, each with 10–20 teacher students enrolled in upper-secondary STEM teacher education programs. The seminars were integrated into courses where peer feedback was a central component, and the activity focused on both receiving and giving feedback.

During the seminars, the teacher educators used a think–pair–share structured activity (Apriyanti & Ayu, 2020; Lyman, 1981), as illustrated in Table 1. The activity included an additional step where students received individual AI-generated feedback on their written reflections through the response system Curipod. According to Curipod’s publicly available AI Principles, its AI feedback function was, at the time of data collection, powered by OpenAI GPT-4o. Curipod states that teacher and student data are not used to train model parameters, consistent with the European Union’s General Data Protection Regulation (GDPR) compliance. For this study, we modified the default feedback prompt so that the AI was instructed to act as an experienced Swedish teacher educator responding to teacher students’ reflections on what constitutes good feedback. The prompt specified that the feedback should model high-quality feedback practices, acknowledge and build on the student’s reasoning, and end with a follow-up question encouraging continued reflection.

## Participants

In total, twenty-nine teacher students took part in the three seminars. Participation in the data collection was based on seminar attendance and voluntary consent, not on prior experience with AI. Seven students volunteered for follow-up interviews. The sample included participants from each seminar group with variation in program year and STEM subject area. In reflexive thematic analysis, adequacy is evaluated in terms of depth and richness rather than quantity; seven interviews provided sufficient diversity for analytic development (Braun & Clarke, 2019, 2021).

All participants received written and oral information and provided informed consent. No sensitive personal data were collected; written reflections were anonymous, and interview data were pseudonymized at transcription. Participation was voluntary, and students could withdraw without consequence. Data were stored on the university’s secure servers with restricted access. The study follows the Swedish Research Council’s guidelines (2017) and the ALLEA (All European Academies) Code (2023). According to Swedish regulations, formal ethical review is not required for studies without sensitive

**Table 1.** The process of the think–pair–share activity.

Think	The teacher educator presented the question, ‘What is good feedback?’ prompting the teacher students to reflect individually for a few minutes and then submit their reflections as written responses in the response system.
AI-generated feedback	Each student received an individual feedback message via Curipod’s AI feedback function. (Modified prompt as described above.)
Pair	Students discussed their reflections and the AI-generated feedback in pairs.
Share	The teacher educator displayed selected student responses and their corresponding AI-generated feedback on a shared screen. The teacher educator commented on several examples to illustrate how the feedback varied depending on what students had written and invited pairs to share their reflections with the whole group.

personal data, physical intervention, or risk to participants' integrity. The study adhered to the Declaration of Helsinki and the principles of participant protection described by the International Committee of Medical Journal Editors (ICMJE).

### *Written reflections*

The free-text function in the response system was used during the seminars to gather the teacher students' written reflections on how they experienced the AI-generated feedback. The function enabled the teacher students to write free accounts in their own words. This method of gathering written reflections was chosen because it allowed the teacher students to reflect immediately after interacting with the AI-generated feedback, providing timely and authentic insights.

After the activity, the teacher students were asked to write and submit reflective responses as free-text answers in the response system, focusing on their experiences, perceptions of the feedback, and any perceived benefits or challenges associated with the system. These written reflections were collected anonymously at the end of each session. These 29 reflections (3–166 words; mean = 66) formed part of the analytic corpus, together with the interview transcripts.

### *Semi-structured interviews*

Seven semi-structured interviews were conducted via Zoom during the spring and fall of 2024, shortly after the seminars. The interview guide targeted areas aligned with the research question and the questions addressed the experience of receiving AI-generated feedback (e.g. 'How did you experience the situation of receiving AI-generated feedback?'), effects on participation and discussion (e.g. 'How did the feedback affect your participation in the seminar?'), trust in the feedback (e.g. 'How credible did you find the AI-generated feedback compared to feedback from a peer or teacher?'), and connections to their future teaching role (e.g. 'How do you imagine using this kind of feedback in your own classroom?'). All questions were designed to allow elaboration. The interviews were transcribed verbatim in Swedish, and relevant excerpts were translated into English for analysis.

### *Observations*

Observations are frequently used alongside other data collection methods, as this combination allows researchers to capture interactions within their social context and reveal how participants perceive and respond to the situation (Cohen et al., 2018). The first author conducted non-participant observations and produced brief field notes focusing on how students and teacher educators referenced and responded to the AI-generated feedback in pair and whole-group phases. Sessions were not audio- or video-recorded to minimize inhibition and maintain comfort (Cohen et al., 2018; Patton, 2014). The field notes were used to contextualize the interviews and written reflections, but were not used as primary analytic material.

### *Thematic analysis*

To analyze the data, we employed Braun and Clarke's (2006, 2019) six-phase approach to reflexive thematic analysis by initially familiarizing ourselves with the

data, generating initial codes, and creating, reviewing, defining, and naming themes. As this is an exploratory study, we did not begin with a predetermined set of codes. In the first phase, the first author noted initial ideas, impressions, and observations to structure the data. During the second phase, the first author conducted preliminary coding, grouping words or short phrases related to key concepts such as immediacy, time efficiency, usefulness, contextual understanding, ethical concerns, and impersonality. We then discussed these codes to construct themes, which were refined in the third phase. In the final stages, we collaboratively reviewed, defined, and named the final themes.

While primarily inductive, our analysis was inevitably influenced by existing knowledge and theoretical perspectives (Braun & Clarke, 2006, 2019). Even without predefined codes, recognizing meaningful patterns required interpretation and alignment with the research questions. As Byrne (2022) notes, thematic analysis involves a dynamic interplay between inductive and deductive reasoning, where researchers actively decide what is meaningful. In this study, themes were constructed from the data itself, but informed by our conceptual understanding.

## Results

The analysis resulted in five themes: AI-generated vs. human feedback; skepticism and ethical concerns; trust in feedback sources, AI as a participant, and anticipating classroom use of AI-generated feedback.

### *AI-generated vs. human feedback*

Teacher students frequently compared AI-generated and human feedback, describing clear contrasts between them. AI feedback was repeatedly characterized as fast, consistent, and structured. Students noted that the system delivered individualized comments within seconds, and many described this efficiency as valuable in teaching contexts. Teacher feedback, in contrast, was associated with personalization, deeper insight, and the ability to draw on earlier discussions and individual learning trajectories.

Some students described the emotional tone of AI feedback as easier to engage with: 'It might feel less "threatening" to receive feedback from AI than from a teacher since it's less personal.' (written reflection, session 3, student 2). Others questioned its reliability because it was not human-generated: 'It's still not a human who wrote it . . . I don't know how much I should trust it.' (interview, student 6). Perceived neutrality was also raised as a distinction: 'AI isn't biased.' (interview, student 1).

Students also pointed to limits in how AI feedback addressed learning objectives or individual progress. One stated: 'A teacher would have gone deeper into what I did well and why it was good.' (interview, student 4). Across accounts, students described AI feedback and teacher feedback as fulfilling different purposes within feedback practices.

### *Skepticism and ethical concerns*

Several teacher students approached AI feedback with skepticism, questioning its reliability, depth, and ethics. 'Since you know the feedback is AI-generated, you read

it with a slightly critical perspective.’ (written reflection, session 1, student 2). Disclosure of AI use was mentioned as important for enabling such scrutiny: ‘I thought it was good that we knew the feedback was AI-generated, and I believe it’s important that all users are aware of this so they can approach it critically.’ (written reflection, session 1, student 3).

Several students discussed whether using AI for feedback might feel like taking a shortcut or undermining their own learning process: ‘Wow, I actually can’t come up with this myself!? I have to ask AI to get feedback? Is it really okay to take this quick shortcut?’ (interview, student 7). Concerns about reliability and the need for critical engagement recurred, and some students expressed connected ethical concerns about assessment practices, hesitating to delegate evaluative work to AI: ‘I think it feels unethical overall to use AI for assessment and feedback.’ (interview, student 4).

### ***Trust in feedback sources – teachers, AI, and peers***

A recurring aspect of the data was how teacher students compared which feedback sources they were willing to rely on when deciding what to take forward. Several students positioned teacher feedback as the most reliable source, often because they associated teachers with subject knowledge and pedagogical experience. AI-generated feedback was frequently placed second, ahead of peer feedback, in terms of trust. One student stated: ‘AI ranks higher than classmates at least. I’d trust it more than if the class gave feedback.’ (interview, student 4).

The teacher students expressed hesitation about relying on peer feedback due to perceived variations in competence and confidence among their peers. Some emphasized that trusting peer feedback depended on who the peer was: ‘I feel like I need to assume that my peer is someone I consider more competent for me to take their feedback seriously.’ (interview, student 7). Others described peer feedback as difficult to depend on when they were unsure of the reviewer’s level of understanding or experience.

In contrast, several students described AI-generated feedback as consistent and impartial. Its uniform tone and structure were mentioned as reasons it could feel more reliable than peer comments. A few students also described AI feedback as offering perspectives they had not considered or seen presented by their peers.

At the same time, some teacher students questioned whether AI-generated comments could be considered ‘real feedback’, pointing out that they lacked human intention and personal knowledge of the student. This was raised in a group discussion where participants debated whether feedback produced by a probabilistic model could fulfill the same role as teacher or peer input.

Across the seminar discussions, students described using the different feedback sources in distinct ways. Some referred to teacher feedback when they wanted depth or detailed pedagogical reasoning; others used the AI-generated feedback as a starting point for reflection or comparison. Peer feedback was described as useful in situations where students already trusted or shared familiarity with a peer.

These accounts show how teacher students differentiated between feedback sources and described their willingness to rely on each source based on perceived competence, familiarity, consistency, or impartiality.

### ***AI as a participant***

Several teacher students described the AI-generated feedback as an active participant in the activity, shaping the seminar discussions by offering prompts, questions, and points to react to. Some noted that the clarifying questions encouraged further reflection: 'Something I also liked was that it asked questions you could reflect on, not just pointing out what was good or bad. This allows you to reflect on a deeper level.' (written reflection, session 3, student 1).

Students also described moments of disagreement or critique in response to the AI-generated comments: 'Maybe not everything the AI writes is great, but you still get something out of it.' (interview, student 3). During pair and group discussions, they often compared different examples of AI-generated feedback, commented on variation in tone or phrasing, and used these comparisons to talk through their own and others' ideas. As one student noted, these exchanges provided opportunities to draw on one another's insights: 'We got to learn from each other's mistakes, not just our own.' (written reflection, session 3, student 6).

### ***Anticipating classroom use of AI-generated feedback***

Across interviews and written reflections, teacher students explicitly related their seminar experiences of AI-generated feedback to anticipated decisions in their future teaching, articulating concrete examples of how they would use, adapt, or refrain from using such feedback in classroom practice.

Several students envisioned AI-generated feedback as a feasible classroom resource, particularly in relation to time and scalability of feedback: 'Including this as a teacher could benefit learning, since the time it would take a teacher to give each student this feedback is enormously greater than the ten seconds it took the AI.' (written reflection, session 3, student 1). Another student linked this to their approaching professional role: 'Now that I am close to finishing and will soon become a teacher, I would like to become better at this and be able to use it more actively in teaching.' (interview, student 2).

At the same time, students emphasized that AI-generated feedback should remain subordinate to teacher judgment and responsibility. One student described a possible workflow: 'I really believe this can be a tool for teachers . . . the AI writes feedback, the teacher reads the feedback and thinks, okay, is this the feedback I intended to give or not?' (interview, student 6). Similarly, some students highlighted the teacher's duty to critically evaluate AI-generated feedback: 'As a teacher, you really must read it through yourself and check: Is this correct? [. . .] You can use it as support in some cases. But you should never trust it blindly.' (interview, student 4).

Students also connected AI-generated feedback to future teaching about digital competence. One student reflected: 'What we have done is analyze some of the pros and cons of AI, and what a prompt is . . . Younger students also need to develop digital competence . . . This is an exercise that I can carry out with them.' (interview, student 5). Another similarly noted: 'Understanding AI is a part of teachers' digital competence, and also for younger students, since they will need to be able to understand it [AI] as well.' (interview, student 6).

Some students expressed hesitation about using similar AI-feedback activities in their future classrooms, questioning whether such feedback would support younger students' learning. One student emphasized the teacher's role in feedback and assessment: 'I think teachers should have the final say in both assessment and feedback. [. . .] It is the teacher who knows what the student needs to do in order to improve.' (interview, student 4). Another student reflected: 'I haven't decided yet. I don't think I would have done it [used AI-generated feedback], to be completely honest. I would probably have preferred to do something that has a bit more impact.' (interview, student 7). At the same time, AI-generated feedback was described as prompting reflection: 'I still think it is a good idea. You often forget that AI does not provide all the answers and that you must be critical of the source . . . It becomes a thought-provoker for them [the younger students].' (interview, student 7).

## Discussion

This study differs from and extends prior research on AI-generated feedback in education, which has predominantly focused on individual use, often in writing support or automated feedback scenarios (e.g. Dai et al., 2024; Hidayat & Sujarwati, 2024; Picciano, 2024). In our setting, AI-generated feedback was not taken up primarily as an individual time-saving resource (e.g. Kim et al., 2024; Pahi et al., 2024), although time and scalability were mentioned, but was integrated into a peer activity where teacher students reflected on and discussed the feedback. In line with our research question, we explored how teacher students related these in-seminar experiences to their future teaching practice. The collaborative think–pair–share structure meant that AI-generated feedback was immediately taken up in interaction, as students compared it with their own and others' responses and discussed how such feedback might function in their own teaching. Embedded in the activity, the AI-generated feedback from the response system became more than an efficiency tool: it fueled peer discussion and critical reflection, echoing findings that AI-generated feedback can promote engagement in teacher education while prompting concerns about depth and contextual fit (Yildiz Durak & Onan, 2025).

In this sense, the system can be understood as participant-like rather than as a delivery mechanism: its outputs were treated as discussable contributions in the ongoing seminar, without implying agency, intention, or accountability (Birhane et al., 2022; Gibson & Beattie, 2024). This is relevant because it offers a concrete model of how AI-generated feedback can be used as a shared object for discussion – something teacher students also could imagine organizing in their own classrooms. This resonates with MacDowell et al. (2024), who describe generative AI as co-creators in learning contexts, challenging traditional boundaries between tool and interlocutor, and with Gerard et al. (2019), who emphasize that feedback is most effective when collaboratively interpreted. In our case, AI-generated feedback gained pedagogical meaning as students compared it with peers' input, questioned its relevance, and discussed how similar activities might be designed in their own teaching. Importantly, teacher students also framed these experiences through a prospective teacher lens, translating in-seminar feedback encounters into anticipated classroom decision-making about whether, when, and how AI-supported feedback could be used. Taken together, these patterns suggest that the pedagogical significance of AI-

generated feedback lies in the feedback message itself and in how it becomes a basis for comparison, questioning, and discussion.

The findings show that teacher students appreciated the AI-generated feedback primarily for its immediacy, structured format, and potential to encourage participation and critical reflection. It prompted them to reflect on their work by highlighting strengths and areas for improvement, supporting engagement and self-regulated learning (Nicol & Macfarlane-Dick, 2006). The structured nature of the feedback allowed teacher students to quickly engage with their responses, providing a basis for reflection and discussion. This aligns with prior research emphasizing the importance of timely and actionable feedback in formative assessment (Black & Wiliam, 2009; Hattie & Timperley, 2007). At the same time, the activity required the teacher students to consider how such feedback structures might be used with their own students, linking their immediate experiences in the seminar to future teaching.

Teacher students also expressed skepticism about AI-generated feedback, particularly its reliability, validity, contextual sensitivity, and ethical implications. These concerns align with research on AI's limited ability to adapt to individual learning needs and contexts (Markauskaite et al., 2022). Several teacher students questioned whether such feedback supported or undermined learning, reflecting broader debates on the balance between efficiency and critical engagement in AI-supported education (Zhang & Zhang, 2024). While seen as efficient, AI-generated feedback was also perceived as a potential shortcut, reinforcing the need for AI literacy in teacher education (Sperling et al., 2024). Similarly, Zhan and Yan (2025) show that students' engagement with ChatGPT feedback can remain superficial without such feedback literacies. In our study, teacher students' doubts about 'shortcuts' and their focus on critical scrutiny points to emerging forms of AI literacy, as they considered when AI-generated feedback is or is not appropriate in classroom practice.

A key finding was the distinct hierarchy in how teacher students ranked different feedback sources: teachers were seen as the most credible, followed by AI-generated feedback, with peer feedback at the lowest level of trust. As noted earlier, we understand trust here as the degree to which students are willing to rely on a feedback source when considering next steps (Carless, 2012; Carless & Boud, 2018). The high ranking of teacher feedback is consistent with previous research emphasizing the role of pedagogical expertise, contextual awareness, and relational depth in human feedback (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006), even though some studies report that it can be perceived as less fair and harder to accept than peer or AI-generated feedback (Weidlich et al., 2025). Teachers' ability to provide personalized insights and align feedback with learning objectives contributed to why teacher feedback was described as more reliable. Skepticism toward peer feedback has also been documented in higher education more broadly (Hamer et al., 2015), suggesting that pedagogical principles and perceptions of authority and expertise may shape students' trust in feedback.

Interestingly, most of the teacher students placed AI-generated feedback above peer feedback, referring to its perceived objectivity, consistency, and structured nature. This aligns with studies suggesting that AI-generated feedback is often clearer and more aligned with assessment criteria than human feedback (Carvalho et al., 2022; Dai et al., 2024). Our data do not allow us to determine whether AI-generated feedback was, in fact,

'better' than peer comments in this specific activity; rather, we interpret the trust hierarchy as an indication of how the teacher students began to use evaluative judgment when deciding which sources they could rely on. This pattern also highlights a potential tension for teacher education: how to support critical engagement with AI while also strengthening peer feedback as a learning resource, given that well-structured peer feedback can support formative assessment (Black & Wiliam, 2009).

The low ranking of peer feedback is notable, given that these teacher students are training to become educators. Their reluctance to trust peer feedback may indicate a gap between the intended role of peer feedback in teacher education and how it is experienced in practice. From the perspective of evaluative judgment (Boud & Molloy, 2013; Carless & Boud, 2018), the activity can be seen as a site where teacher students began to compare feedback sources, but did not yet fully recognize peer feedback as a resource for professional learning. This hesitation may reflect a broader challenge in teacher education – supporting future educators to value peer collaboration as part of professional learning communities (Punie & Redecker, 2017). Given the emphasis on peer feedback as a formative strategy in teacher education (Sluijsmans et al., 2002), this suggests a need for opportunities to design, trial, and critically review peer feedback activities as part of coursework.

The teacher students recognized AI-generated feedback as a useful tool for its potential to reduce workload by providing immediate input to large groups, allowing teachers to focus on more complex aspects of instruction. This aligns with research promoting the integration of AI to enhance efficiency while maintaining a human-centered pedagogy (Jacobsen & Weber, 2025). Several teacher students viewed AI as a complement rather than a replacement, proposing a hybrid model where AI delivers initial feedback and teachers refine it – a model supported by studies on hybrid feedback (Kim et al., 2024; Pahi et al., 2024). At the same time, teacher students noted the risks of over-reliance on AI. While they valued its structure and neutrality, they stressed that teachers must remain the primary evaluators of learning. This reflects ongoing debates about AI in education, where its role is to support, not replace, teachers' professional judgment (Selwyn, 2024). In accounts of future teaching practice, teacher students thus positioned AI-generated feedback as one feedback resource among several, to be orchestrated alongside teacher and peer input.

### ***Limitations and future research***

This study is limited by its specific seminar context and the short-term nature of teacher students' engagement with AI-generated feedback, offering limited insight into longer-term effects on learning, teaching strategies, or professional judgment. The analysis focused on participants' accounts, and we did not examine the AI-generated feedback texts or peer contributions themselves, which restricts claims about the comparative quality of different feedback sources. Our findings, therefore, reflect how participants described, interpreted, and related the feedback to their prospective teaching.

Future research should examine how the repeated use of AI-generated feedback influences such reasoning over time, ideally through longitudinal studies in varied settings. It should also explore how teacher and AI feedback can be combined effectively while building AI literacy through ethical and pedagogical reflection.

## Conclusion

This study explored how teacher students experienced AI-generated feedback provided through a response system during campus-based seminars and how they related these experiences to their future teaching practice. The findings show that the teacher students made sense of the AI-generated feedback as students and as future teachers who will need to decide when, why, and how such tools may support teaching practices, such as strategies for formative assessment. Their reflections foregrounded both possibilities and limitations, linking their immediate seminar experiences to considerations about teaching design, workload, and pedagogical responsibility.

Across the data, teacher students valued the AI-generated feedback for its immediacy, structured format, and ability to prompt further reflection. In the context of the think-pair-share activity, the AI-generated comments created a shared reference point that supported participation and comparison across peers. Rather than functioning only as a time-saving shortcut, the feedback became part of how teacher students engaged with the task – something they could respond to, compare, and build on during their discussions.

At the same time, teacher students questioned the reliability, contextual understanding, and ethical defensibility of relying on AI for evaluative work. These concerns reflect a need for AI literacy, including the ability to review AI-generated feedback before acting on it, identify when it is too generic or context-blind, and decide whether it should be used as a discussion prompt, revised by the teacher, or set aside.

A central finding was the trust hierarchy: teacher feedback was most trusted, AI-generated feedback ranked second, and peer feedback ranked lowest. Using trust as a basis for reliance (Carless, 2012; Carless & Boud, 2018), the results highlight how teacher students evaluated different feedback sources when considering their next steps. Their preference for AI over peer feedback was grounded in their perceptions of consistency and impartiality rather than uncritical enthusiasm for AI. These perceptions matter for teacher education, as they may shape how future teachers weigh algorithmic, teacher, and peer input when designing feedback practices.

Taken together, the results suggest a need for structured opportunities in teacher education to compare and critically evaluate feedback from multiple sources, including AI, so that AI literacy and feedback literacy can be developed together, and future teachers can determine when and how AI, teacher, and peer feedback should be combined. When teacher students analyze how and why feedback differs, and how different sources can be combined meaningfully, they can strengthen the pedagogical judgment required to use AI-generated feedback responsibly in their own classrooms.

For teacher education programs, this suggests the value of integrating activities that examine AI-generated, teacher, and peer feedback side by side. For practicing teachers, the findings indicate that AI-generated feedback may support participation and initial reflection but cannot replace human pedagogical insight. Professional development should therefore enable teachers to try out AI-supported feedback, discuss ethical and pedagogical implications, and determine when AI-generated input supports or constrains learning.

## Author's contribution

**Patricia Diaz:** Conceptualization, Methodology, Formal Analysis, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review and Editing, Project and Administration.

**Stefan Hrastinski:** Conceptualization, Methodology, Writing – Review and Editing, Supervision, Funding Acquisition.

**Per Norström:** Conceptualization, Methodology, Writing – Review and Editing, Supervision.

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## Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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